Course title	Computer Modelling
Institute/Division	Faculty of Computer Science and Mathematics/ Department of Computer Science
Course code	F-1.CM
Erasmus subject code*	11.0, 11.3, 11.9
Number of contact hours**	45h
Course duration	1 semester (Fall)
ECTS credits	6
Course description (max 100 words)	The course is divided into three parts: 1) Ordinary Differential Equations (ODEs) – you will learn what are ODEs and how to solve them using computer (finite difference methods – Runge-Kutta). Then you will learn how to model nature using ODEs. 2) Partial Differential Equations (PDEs) – you will learn what are PDEs and how to solve using computer classical PDEs like advection, wave, heat and diffusion equations. 3) Monte Carlo methods – you will learn how to solve problems using random numbers. This include random walking and simulated annealing problems. Each part ends with group project that is related to modeling real world problems using methods learned from the course. We will use C/C++ and Python as programming languages. I will introduce basic concepts for Python language, so only some basic experience in computer programming is needed.
Literature	[1] R.H. Landau, M.J. Paez, C.C. Bardeianu, 'Computational Physics' , Wiley 2015 [2] W-H Steeb, 'The nonlinear Workbook', World Sceintific 2011 [3] S. Teukolsky et al., 'Numerical Recipes', Cambride 2007 [4] K. Gustafson, 'Introduction to Partial Differential Equations and Hilbert Space Methods', Dover 1997
Course type/organization	Lectures + Computer laboratory
Assessment method	Group projects
Prerequisites	Basic programming skills, e.g., in C/C++ or similar language. Programming in Python will be an advantage however is nor required.
Primary target group	Engineers and computer scientists who are interested in using computers to describe surrounding world.
Contact **person**	Radosław Kycia
Remarks	

*please insert one of the following codes:
11.0 Mathematics, Informatics
11.1 Mathematics
11.2 Statistics
11.3 Informatics, Computer Science
11.4 Artificial Intelligence
11.5 Actuarial Science
11.9 Others Mathematics, Informatics

**1 lecture hour=45 minutes